

The Examiner is respectfully advised that an Information Disclosure Statement for the instant application is in preparation and will be filed shortly.

Applicants respectfully traverse the Examiner's withdrawal of Claims 51 and 52. Claim 51 is directed to a method for outputting information from a printing head, wherein a printing head is provided, and a memory and a converter are provided in the printing head, and information stored in the memory and a signal converted by the converter are read out by using a clock signal for inputting the print signal. Applicants respectfully point out that Claim 17 is directed to a printing head including the same features. Further, Claim 17 is not limited to thermal inkjet printers.

Claim 52 is directed to a method for outputting information from a printing head, wherein a printing head is provided, and a non-volatile memory is provided in the printing head, and information stored in the memory is read out by using a clock signal for inputting the print signal withing a period in which the print signal is inputted. Applicants respectfully point out that Claim 28 is directed to a printing head including the same features, and that Claim 28 is not limited to thermal inkjet printers.

Accordingly, it is requested that Claims 51 and 52 be examined in this application.

Applicants note with appreciation the indication that Claims 38-45 are allowed and that Claims 20-24 would be allowable if rewritten so as not to depend from a rejected claim, and with no change in scope. These claims have not been so rewritten because, for the reasons given below, their base claim is believed to be allowable.

Claims 1-19, 25-37, and 46-50 were rejected under 35 U.S.C. § 103(a) over U.S. Patent 5,851,075 (*Imai*). Applicants respectfully traverse these rejections.

Independent Claim 1 is directed to a printing head where an electrothermal transducer for generating thermal energy used for discharging ink and a driver for driving said electrothermal transducer are provided on a substrate. According to Claim 1, the printing head comprises a sensor which detects the condition of the substrate and outputs an analog signal, and an A/D converter which converts the analog signal from the sensor into a digital value to be outputted to the outside of the printing head. Also, according to Claim 1, the sensor and the A/D converter are provided on the substrate. Independent Claims 10 and 46 both include features similar to those recited in Claim 1.

One important feature of Claims 1, 10 and 46 is that a sensor for detecting the condition of the printing head and an A/D converter for converting the sensed signal into a digital signal are provided in the printing head substrate, whereby the sensed signal is converted into the digital signal within the substrate. By virtue of this feature, information within the printing head is accurately obtained without time delay.

According to Applicants' understanding, *Imai* relates to an ink jet printer including temperature management capabilities. *Imai* shows a temperature sensor (thermistor) 3 fixed on ink jet head 2. However, according to *Imai*, temperature detecting circuit 8 (A/D converter) for outputting pulse signals indicative of the sensed temperature is mounted on carriage circuit board 4, which is located outside of ink jet head 2 (see col. 2, lines 33 and 34; Figs. 2 and 3). Accordingly, Applicants submit that nothing in *Imai* would teach or suggest the above-identified feature of Claims 1, 10 and 46.

Independent Claim 17 is directed to a printing head which performs printing by discharging ink in accordance with an ink-jet method, and which comprises a memory for storing information of the printing head, a converter which converts an analog signal into digital signal and outputs the digital signal, and a driver which drives the plurality of printing elements in accordance with an input print signal. Also, according to Claim 17, the information is read from the memory by using a clock signal and a latch signal for inputting the print signal, and the digital signal is outputted from the converter by using the clock signal. Independent Claim 51 contains features similar to those recited in Claim 17.

One important feature of Claims 17 and 51 is that a memory and a converter are provided in the printing head, and information stored in the memory and a signal converted by the converter are read out by using a clock signal for inputting the print signal. By virtue of this feature, the information from the memory and the digital signals from the converter are obtained without increasing the number of signal lines. Accordingly, the number of signal pads in the printhead and carriage is not increased, and the connecting portion of the printhead and the carriage can be downsized.

In contrast, *Imai* shows an ink jet printer having ROM 34, for storing a drive voltage setting program, located outside of ink jet head 2 (see Fig. 2). Accordingly, *Imai* would require an extra signal line to transmit or receive a signal between the printing head and printer. Applicants submit that nothing in *Imai* would teach or suggest the above-identified feature of Claims 17 and 51.

Independent Claim 28 is directed to a printing head which performs printing in accordance with an input signal, and which comprises a nonvolatile memory for storing

information about the condition of the head, and output means for outputting that information, in a serial format, to the outside of the head, by utilizing a clock signal and a latch signal used for inputting the print signal, within a period in which the print signal is inputted. Independent Claim 52 contains features similar to those recited in Claim 28.

One important feature of Claims 28 and 52 is that information stored in a memory is read out by using a clock signal for inputting the print signal, within a period in which the print signal is inputted. By virtue of this feature, reading out from the memory is performed simultaneously with inputting the print signal, and the reading operation does not affect the input operation. Accordingly, it is not necessary that extra time be set aside for reading the information from the memory.

In contrast, *Imai* does not show this simultaneous reading out of information from the memory and inputting of the print signal. Accordingly, in *Imai*, reading out information from the memory requires extra time beyond that required for the inputting the print signal. Applicants submit that nothing in *Imai* would teach or suggest the above-identified feature of Claims 28 and 52

Since *Imai* does not contain all of the elements of any of the independent claims discussed above, these claims are believed allowable over *Imai*.

A review of the other art of record has failed to reveal anything which, in Applicants' opinion, would remedy the deficiencies of the art discussed above, as a reference against the independent claims discussed above. These claims are therefore believed patentable over the art of record.

The other rejected claims in this application are each dependent from one or another of the independent claims discussed above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual consideration or reconsideration, as the case may be, of the patentability of each on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, Applicants respectfully request favorable reconsideration and early passage to issue of the present application.

Applicants' undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our below listed address.

Respectfully submitted,


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VERSION WITH MARKINGS TO SHOW CHANGES MADE TO CLAIMS

46. (Amended) A printing head [where an electrothermal transducer for generating thermal energy used for discharging ink and a driver for driving said electrothermal transducer are provided on a substrate] having a recording element, comprising:

a sensor which detects the condition of said [substrate] printing head and outputs an analog signal; and

an A/D converter which converts the analog signal from said sensor into a digital value, in order to output information on the condition of said [substrate] printing head to the outside of said printing head as a digital value.

49. (Amended) The printing head according to claim 46, [further including a current path for supplying current for driving said] wherein said recording element is an electrothermal transducer.